

Remarks

Each rejection raised by the Examiner is addressed separately below. In view of the claim amendments noted above and the remarks below, Applicants respectfully request reconsideration of the merits of this patent application.

Claims 4, 17, 19, and 21-26 are currently being examined. Claims 25 and 26 have been cancelled. Favorable reconsideration and allowance of this application is respectfully requested.

REJECTIONS UNDER 35 USC §103

The Office Action has maintained the rejection of claims 4, 17, 19, and 21-24 and has also rejected claims 25 and 26 as being obvious over GB 2,197,341 to Quain (Quain) in view of the combination of Handbook of Brewing, US Patent No. 4,329,433 to Seebeck et al. (Seebeck), and US Patent No. 4,840,802 to Lindberg et al. (Lindberg), and further in view of Applicant's own admission on pages 1-4 of the application as filed.

Regarding claims 4 and 17 steps (a), (b), (d), and (e), the Office Action states that Quain teaches a method of brewing beer by suspending yeast in a wort-free aqueous solution and aerating the suspension for a period of time with a gas comprising oxygen to allow oxygen uptake by the yeast required for sterol and unsaturated fatty acid synthesis. Applicants argue that they have distinguished themselves from Quain by claiming that the gas comprising oxygen is delivered above the maximum oxygen uptake rate of the yeast wherein the period of time is 8 hours up to about 21 hours.

The Office Action also claims that Quain's statement that "the oxygen content of aqueous suspension is monitored and the rate at which the oxygen is introduced is increased in such a manner as to maintain the concentration of oxygen in the suspension substantially constant" and that "oxygenation continuing at least until such time as there is no longer any need to increase the rate of introduction of oxygen to maintain the same concentration of oxygen in the suspension" teaches that the oxygen introduction rate to the yeast solution is progressively increased above the uptake rate of yeast until at least the time when the yeast reaches its maximum oxygen uptake rate and the delivery or supply of oxygen is maintained afterwards, as claimed. Applicants respectfully disagree.

A close reading of Quain reveals that "oxygen (alone or as part of a gaseous mixture) is introduced into an aqueous suspension of yeast, the oxygen content of the suspension is monitored, and the rate at which oxygen is introduced is increased in such a manner as to maintain the concentration of oxygen in the suspension substantially constant, oxygenation continuing at least until such time as there is no longer any need to increase the rate of introduction of oxygen to maintain the same concentration of oxygen in the suspension." Quain is very careful to maintain the concentration of oxygen in the suspension as substantially constant. In Quain, "brewers' yeast is treated with oxygen until the rate at which it takes up oxygen reaches or at least closely approaches a maximum in the prevailing conditions." Applicants' claims recite that the gas should be delivered above a maximum oxygen uptake rate of the yeast for a period of time from about 8 hours up to about 21 hours. Quain teaches away from this.

Regarding the newly added limitation of the time of aeration or oxygenation of 8-21 hours, the Office Action correctly states that Quain teaches that oxygenation is continued until such a time as there is no longer any need to increase the rate of introduction of oxygen to maintain the same concentration of oxygen in the suspension. In Quain's example, the yeast was aerated for six hours. However, the Office Action contends that it is the intent of the Applicants to continue oxygenation only until the maximum oxygen uptake rate of the yeast is reached. Applicants, however, as disclosed in the specification argue that when oxygen is being delivered at a rate in excess of the yeast's maximum OUR, the amount of aeration is dependent strictly upon the yeast's exposure time (see p. 8, lines 8-10, p. 10, line 26 through p. 11, lines 1-8, and p. 14, lines 1-25). While the length of aeration may vary when using the method of Quain, Quain does not consider that longer aeration times reduce the time to the end of fermentation considerably.

Nothing in Quain or the Handbook of Brewing teaches or suggests one of skill in the art to "aerate the yeast suspension for a period of time with a gas comprising oxygen to allow oxygen uptake by the yeast, wherein the gas is delivered above a maximum oxygen uptake rate of the yeast and wherein the period of time is 8 hours up to about 21 hours." Therefore, Applicants submit that neither Quain nor the Handbook of Brewing can be used to render the subject matter of the pending claims obvious.

Regarding the liquid adjunct and cereal sugar claims, the Office Action concedes that Quain is silent regarding the addition of cereal sugars to the yeast suspension as cited in claims 4 and 17. However, the Office Action contends that an "adjunct" is broadly defined as "something that is added" and thus concludes that the aqueous solution of Quain constitutes a liquid adjunct. The Applicants respectfully disagree with this characterization. In the beer brewing industry, "adjunct" is a term of art. The Handbook of Brewing defines adjunct as, "any carbohydrate source other than malted barley which contributes sugars to the wort" (p. 121). According to this definition, as used by those skilled in the art, the aqueous solution of Quain does not constitute liquid adjunct as it does not contain a carbohydrate source other than malted barley that contributes sugars to the wort. In fact, Quain teaches the use of "liquor", which, as used by those skilled in the art, is defined as, "the brewer's word for water used in the brewing process, as included in the mash or, used to sparge the grains after mashing" (see Beer & Brewing Terminology in the attached excerpt from *Beeradvocate*). Therefore, Applicants respectfully submit that Quain's "liquor" does not constitute liquid adjunct as claimed.

The Office Action next contends that according to the Handbook of Brewing, the ability of brewer's yeast to absorb and metabolize maltose and maltotriose is essential to the determination of brewer's yeast's quality. However, nothing in Quain or the Handbook of Brewing provides any teaching, suggestion, or motivation to modify the combined teachings to add cereal sugars to an aerated yeast suspension other than testing a sample to determine yeast quality.

The Office Action also contends that claims 4 and 17 are obvious over The Handbook of Brewing in view of Seebeck because, "aeration and cultivation of yeast in a nutrient rich medium comprising sugars, as claimed, was known in the art at the time of the invention." However, Seebeck discloses a continuous fermentation method for solutions such as grape juice. The yeast is first aerobically cultured in a nutrient solution, and when the yeast reaches a certain concentration level, a fermentation media is continuously added to the cultured yeast for continuous fermentation. Throughout the Seebeck patent, the nutrient solution is described as preferably being a fruit juice (see col. 2, line 67 to col. 3, line 1; col. 3, lines 15-17; col. 6, lines 17-18; and col. 8, lines 49-54) and the fermentation media is described as preferably being a fruit juice (see col. 3, lines 66-68; col. 4, lines 16-18; col. 5, lines 15-18; col. 6, 62-65; col. 7, lines 37-

38; and col. 9, lines 57-59). In particular, the Examples of Seebeck use fruit juices as the nutrient solution and the fermented solution.

However, nothing in Seebeck suggests a suitable nutrient solution for culturing yeast that is used to ferment beer wort. Given that Seebeck repeatedly suggests a fruit juice nutrient solution for culturing yeast that is thereafter used to ferment a fruit juice, it is submitted that upon reading Seebeck, one skilled in the art would be motivated to use wort as the nutrient solution for culturing yeast that is thereafter used to ferment wort. In fact, the culturing of yeast in smaller volumes of wort prior to fermenting wort is a known process (see page 4, lines 11-16 of the present application) that one skilled in the art would be motivated to use in the continuous fermentation methods of Seebeck given the expected mixing of residual amounts of nutrient solution and fermentable solution in the Seebeck reactor. Certainly, one would not be motivated to use a fruit juice nutrient solution (as in Seebeck) to culture yeast in a reactor that is later charged with beer wort.

Thus, while Seebeck does suggest the continuous fermentation of beer wort, nothing in Seebeck suggests the use of a wort-free solution for culturing yeast that is later used to ferment beer wort. Accordingly, it is respectfully submitted that claims 4 and 17 are patentable over Seebeck, and are further distinguishable in that nothing in Seebeck suggests the fermentation of non-aerated wort. In fact, the fermentation tower in Seebeck provides for the introduction of gases into the reactor.

The Office Action concedes that Quain is silent regarding the addition of zinc to the yeast suspension or the liquid adjunct as recited in step (c) of claims 4 and 17. However, the Office Action alleges that Lindberg teaches that zinc is added to yeast fermentations to enhance yeast growth during fermentation to consequently increase the fermentation rate and that the Handbook of Brewing teaches that adding zinc to water used in brewing processes was known.

Applicants respectfully argue that their invention has distinguished itself from the prior art. Lindberg and The Handbook of Brewing teach the addition of zinc to a yeast/wort solution. From column 1, lines 33-36 of Lindberg, it is evident that the reason for the zinc addition is the zinc deficiency of wort. On page 216, The Handbook of Brewing also refers to key nutrient deficiencies of wort as well as the fact that zinc supplies particulate matter to the fermenting wort to provide key nucleation sites for CO₂. Thus, the motivation to add zinc to wort as described in

Lindberg and The Handbook of Brewing is not present in the claimed invention because the zinc is added to the aqueous yeast solution. There is nothing in either Lindberg or The Handbook of Brewing that teaches the value of zinc in a wort-free solution for culturing yeast. Thus, one would not have been motivated to include zinc in a wort-free solution for culturing yeast. Accordingly, it is respectfully submitted that that claims 4 and 17 are patentable over Lindberg and The Handbook of Brewing.

Regarding claims 25 and 26, the Office Action contends that Quain teaches the addition of distilled water or other aqueous solution. It goes on to argue that water has a neutral pH of 7, which is more than a pH of 6 as claimed. Without agreeing to the Office Action's characterization, and solely to move the case to allowance, Applicants have cancelled claims 25 and 26. Applicants now believe that all claims are in condition for allowance.

SUMMARY

Having addressed each issue raised by the Examiner, claims 7, 17, and 21-24 are believed to be in condition for allowance, and a Notice of Allowance is respectfully requested. Should any issues remain outstanding, the Examiner is invited to contact the undersigned at the telephone number appearing below if such would advance the prosecution of this application.

No other fee is believed to be due in connection with this response. However, if any fee is due in this or any subsequent response, please charge the fee to the same Deposit Account No. 17-0055.

Respectfully submitted,

Date: January 5, 2009

/Richard T. Roche/
Richard T. Roche, Reg. No. 38,599
Quarles & Brady LLP
411 East Wisconsin Avenue
Milwaukee, Wisconsin 53202
Tel. No. (414) 277-5805
Fax. No: (414) 978-8805